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ABSTRACT OF THE DISCLOSURE

It is desirable to enhance reproducibility and control of batch fermentation processes. Some examples of these processes include: alcoholic beverage manufacture, and acetone and pharmaceutical production. A cellular yield curve defines the relationship between substrate utilization and cellular growth. The cellular yield curve is be used to create a mass balance between all of the reacting chemical species. This mass balance methodology is utilized to monitor the course of the reaction. The accurate description of the fermentation that is produced can facilitate reproducibility. Also, careful tracking of the course of the reaction can enable precisely timed interventions that will have an effect on the final outcome.